Stormwater Concentration Estimation

Eric Blischke to: ChappellRW 10/28/2008 10:37 AM
Cc: Chip Humphrey, Kristine Koch

Rick, here is the information and a brief summary.

As part of the Portland Harbor project, stormwater data was collected on a land-use basis. The purpose of the sampling is to develop estimates of stormwater loads for input into estimation tools and models. A total of 31 basins were sampled. Flow-weighted composite samples of three storm events from each location were collected to obtain "event mean concentrations." Target storm conditions were developed (>0.2 inches of rain over a minimum of a 3 hour period following a 24-hour dry period). Event mean concentrations are what we are dealing with in the data set.

During design of the study, it was agreed to evaluate the data on concentration basis. Stormwater data would be averaged for each land-use type and extrapolated to other similar basins where data does not exist to develop estimates of overall stormwater load. However, once the data was received, the use of an alternate approach - flow weighting - was discussed.

Evaluation by EPA did not see a correlation between the size of the basin or flow and contaminant concentration. However, certain members of the stormwater technical team felt that within a given land use area, larger areas and/or flow were "more representative" than smaller areas and/or flow. Due the lack of correlation and uncertainty surrounding the flow estimates, EPA determined that we should stick with the original concentration based approach. However, EPA allowed the use of a weighted approach as an alternative.

Two weighted approaches have been proposed. The two approaches are summarized in a series of documents including the "kochWeighted data approach" document, the "DEQ thoughts" document, the "koch_DEQ's comments" document and the "Current EPA recommended approach" document. These documents, hopefully, in a messy sort of way illustrate the various approaches. The three approaches are also summarized in the two attached spreadsheets.

Essentially the approaches are as follows:

Concentration based approach: All data from a given land-use type are combined into one data set in order to develop estimates of the mean and an understanding of the range of contaminant concentrations.
Weighted Approach 1 (Kristine's approach): In this approach, each value is weighted based on flow. Flow adjusted concentrations are estimated for each measured concentration and used to develop estimates of the mean and an understanding of the range of contaminant concentrations.
Weighted Approach 2 (DEQ/City of Portland Approach): In this approach, mean concentrations from each basis are estimated, weighted according to flow and summed to develop load estimates. The LWG variation multiplies the flow-weighted average by the number of basins samples and calculates a mean.

Please evaluate the strengths and weaknesses of each approach and recommend a preferred approach. The summary and recommendation should be 1 - 2 pages in length. We would like this as soon as possible.

Please let me know if you have any questions or need additional information.

Kristine, if you would like to add any additional information, please do so.

Thanks, Eric


koch_DEQ's comments on EPA's draft approval ltr.docx


kochWeighted data approach Sep 2 08.doc

Current EPA recommended approach.doc

kkStormwaterLoadingExample.xls

Example Calculation Methods.xls

DEQ's thoughts on SW Calc method.doc